TECHNICAL Writing REVIEW

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OUR NATIONAL ECONOMY DEPENDS UPON GOOD TECHNICAL MANUALS

by HENRY E. MARSCHALK

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How many of you ever have considered what might happen to today's complex economy if suddenly there were no technical manuals? The vast assortment of machinery in industry – your automobile and television, the commercial transportation and communications industries, the channels of food supply and refrigeration, virtually everything dependent upon machinery of any kind would haltingly grind to a general slowdown or stop. Similarly, the exceedingly complex devices of the military – everything from machine guns to guided missiles and H-bombs – would have their effectiveness impaired in some way. Why? Because technical devices generally have become so complex that all necessary information as to their correct operation and maintenance cannot be retained in the thinking of even the most capable individual.

It seems logical also, that to the degree our technical manuals are improved in ready understandability, there would be a corresponding increase in freedom from operation and maintenance failures. The wheels of industry should turn more smoothly; the weapon systems our military have devised should perform with increasing reliability.

Whether such publications are called instruction pamphlets, handbooks, or servicing guides is not of great importance. However, present tendency in the military is to call them *technical manuals*.

Now, it is interesting to note that the words *technical* and *manual* do not appear together in a dictionary, even in Webster's Unabridged; although, of course, there are definitions for them separately. A simple definition of the word "technical" is: 'Relating to the *mechanical* arts; having to do with the exact or *mechanical* part of any art or science.' Since the word mechanical pertains to the laws of matter and motion, we find the definition of *technical* to be generally adequate.

But what of the word "manual?" Here, we find its nearest applicable definition to be 'A handbook; a small book of instructions.' Please note that word *small*. The other day I perused just one volume of a certain military technical manual. That one volume was 4-½ inches thick! Several others in the set were nearly as bulky. Yet the manual concerned just one design of gun fire control equipment. That publication was one of many similar ones needed by the military in these times.

In some instances the machinery of industry also has become so complex that it, too, requires instruction books of large size to fulfill definite needs in any well-rounded program of effective operation and maintenance.

In view of all this, we might define today's desired technical manuals, particularly those of the military, as 'Handbooks of clear and effective instructions in the operation and maintenance of mechanisms or systems which may range from the relatively simple to the highly complex.' How did we arrive at this stage of manual development? Why are such books needed? The answers to these questions are found after a brief review of the textbook needs of relatively modern military technology itself. It should be emphasized, too, that the instruction book requirements of industry have run a somewhat parallel, though generally lagging, course.

As early as the 16th Century there were instruction books on the use and care of military weapons. Such books, however, were attempts at coverage of broad classes of weapons, such as artillery. In those times, and until about 100 years ago, an artilleryman learned 'the book.' The book covered just about all that his branch of the service was supposed to know; the various designs of weapons available to him, their ammunition, and the simple elements of drills, wartime use, maintenance, and tactics. Similar books were prepared for the infantry.

So far as I have been able to learn, the first technical manual ever prepared to cover a specific weapon was that written in 1856 by Commander John Dahlgren, the distinguished designer of an advanced type of naval gun, who later became Chief of the Bureau of Ordnance.

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SOCIETY PROCEEDINGS

A QUARTERLY PUBLISHED BY THE
SOCIETY OF TECHNICAL WRITERS
TWENTY EIGHT NEWBURY STREET BOSTON SIXTEEN MASSACHUSETTS
PUBLICATIONS COMMITTEE: EDWARD J. DOWE, CHAIRMAN; GEORGE D. HECHT; ALAN D. MAIER

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SEPTEMBER MEETING

The first meeting of the 1954–1955 season was held September 30 at 28 Newbury Street, Boston 16, Massachusetts.

President Paul H. Flint briefly described the activities of the Executive Committee which met frequently during the summer months and devoted much time to the complex problems of membership qualifications and a national constitution.

Committee reports were the next order of business and the following chairmen presented brief summaries: Mr. Michael Di Bartolomeis (Emblem); Mr. Edward Dowe (Publications); Mr. Sydney Shapiro (Public Relations); Mr. Harold Tanner (Program); Dr. Francis Achard (Membership); and Mr. Ronald Eames (Executive).

Treasurer Ralph Fullerton presented the financial report of the Society.

Mr. John Hansen discussed his observations during a visit to the Chemical Literature Society meeting which was held in mid-September in New York City.

An amendment to the By-Laws proposing five yearly meetings instead of the present eight meetings was placed before the membership for a vote, carrying the recommendation by the Executive Committee that it be defeated. The amendment was defeated.

The second proposed amendment concerning changes in the By-Laws relating to Membership was presented to the body and discussed at great length. The vote was in the affirmative, and as a result, By-Law Amendment Number 1 has been made:

Article III Section I. There shall be five grades of membership: Senior Member, Member, Associate Member, Special Member (non-voting) and Student Member (non-voting).

Article III Section III. Until September 1, 1955, Associate Members, Members and Senior Members shall have the same rights and privileges.

Article III Section IV. Dues. The annual dues of the members of the Society shall be as follows:

Senior Member	$10.00
Member	7.50
Associate Member	5.00
Special Member	2.00
Student Member	1.00

Annual dues shall be payable at or before the October meeting.

Turning to new business, the President informed the group that the Society had received an invitation to send a speaker-delegate to a conference to be held in San Francisco on December 28 by a group of writers in that area. Since it does not appear likely that a personal visit can be arranged, it was suggested that a tape-recorded address be forwarded to the chairman of the conference.

MEMBERSHIP QUALIFICATIONS

The Executive Committee adopted the following definition of technical writers and outlined the qualifications for the various grades of membership, as follows, during a board meeting held on September 22, 1954:

Definition of Technical Writers

1) A technical writer is one who:
(a) As his principal function (1) secures, organizes and presents in writing, scientific or engineering information in such forms as technical reports, instruction books and comprehensive parts catalogs that require for their preparation an extensive knowledge of the functions of the equipment; or (2) edits, reorganizes and rewrites such material; or
(b) Teaches the principles and practices of technical writing and related subjects.

Grades of Membership – Eligibility for

1. Associate Member
Demonstration of a continuing interest in the field of technical publications.

2. Member
Three years experience as a technical writer.
A baccalaureate degree from a school of recognized standing shall count as one year of experience.

Such education must include a major in science or technology, or a major in English with a minor in science.

3. Senior Member
Six years experience as a technical writer, of which three years will have qualified the applicant for the grade of member, and three years shall have been spent in responsible charge of the preparation of technical publications. Membership as a Member of the Society for one year is also a requisite.

4. Student Member
Attendance at a school of recognized standing and a demonstration of a continuing interest in the field of technical publications.

5. Special Member
Demonstration of a continuing interest in the field of technical publications and works or resides outside the commuting area of Boston, Massachusetts.

MEMBERSHIP NEWS

Membership in the Society, both locally and nationally, has continued to grow. The first issue of the *REVIEW* carried a roster of members as of June. The following members have been admitted to the Society in the period from June to late September. The names of additional members will continue to be published in subsequent issues of the *REVIEW*.

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Schenectady, New York
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TECHNICAL WRITERS INSTITUTE-OBJECTIVE: BETTER WRITING

by RONALD D. EAMES

Mr. Eames is Section Head of Publications at Raytheon Manufacturing Company, Waltham, Massachusetts.

My first contact with technical writing as a profession was, "Here, take this book and study it for a week or so." The war was only six months old and, after running a five-and-ten for five years, I had a war job. For a week that book on echo-ranging gear had me completely baffled. I had no idea what underwater sound was or what it did or how it did it. At the beginning of the second week the instructions were, "These units have been going out the door for a couple of months but there's no instruction book yet. See how fast you can get one ready." And an armful of schematics was handed to me – no specifications, no editing, no fancy artwork, no guarantee that the parts list or schematics were accurate, no test information, no time for conferences with the engineer, and fortunately, no Government approval requirement.

Today, technical writing is a recognized profession and procedures are reasonably well standardized. But how about the men who will do the work? Although the hit-or-miss methods of a dozen years ago have been ironed out, well-trained personnel are not being prepared fast enough to fulfill the requirements of science, industry, and the armed services. The framers of our by-laws recognized this deficiency and declared one of our purposes to be "encouraging the development and training of technical writers."

The second annual Technical Writers' Institute met at Rensselaer Polytechnic Institute, Troy, New York, early this summer for a short, informal, practical, and stimulating course of study designed to assist in overcoming that deficiency. A full five days were devoted to lectures, laboratory practice, group discussions, and individual counseling by the staff. An excellent cross section of American industry was represented by the fifty people attending and, as a result, a great diversity of products and services was represented. It was evident, however, that no matter how the other fellow's subject matter differed from yours, the writing problems were similar.

Lecture subjects were:

The Language of Technical Writing
Preparation of the Instruction Manual
Writing the Technical Report
Business Correspondence
Human Relations in Communications
Adapting Technical Material
Writing to Government Specifications
Attaining the Object in Technical Writing

Most of the lectures were followed by actual laboratory problems. For example, the Technical Report problem had as its purpose "training in the organization and writing of an original report." The situation was that of an executive who had become aware that the technical writing produced by his company was not satisfactory. The problem was to plan a short report on problems actually observed in one's own company and to recommend solutions. Introductory and terminal sections were to be written in full and the balance of the report was to be outlined. You may be sure that lights burned late in hotel rooms before problems like that one were finished.

But it wasn't all hard work! The dean of students gave a get-acquainted cocktail party at his home, excellent lunches were served at noon, and a banquet was given at the University Club in Albany. Most important of all, however, were the opportunities to meet people whose problems and interests were the same as yours.

The Institute expected each person attending to obtain "a fuller awareness of the entire field of technical writing, greater skill and assurance in his own writing, and a new perspective of his own capacities. Each participant should return to his company ready to do a better job and to exert a healthy influence of the standards and writing policies within the company". There is little doubt that this goal was attained. And as the writing profession cooperates, the Institute's services will become more valuable in developing and training technical writers.

MEMBERSHIP NEWS ... *continued from page 3*

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Chicago, Illinois
Motorola, Incorporated

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JARGON

by JOSEPH ELDER

Mr. Elder is Science Editor for the Harvard University Press, Cambridge, Massachusetts.

The technical writer has one primary aim in view, in all that he writes. This is to convey to his readers certain information. To accomplish this purpose, the writer must choose his words with care, for in this choice lies his chance of making clear to his readers what he has to say.

It is here that the technical writer has a great advantage over writers in many other fields. He has ready at hand a vocabulary that has been constructed for the purpose of making meanings clear and of avoiding ambiguity. This vocabulary consists of the technical terms of his science. Many of these words may also be used in everyday speech, where they have none of the precision of meaning that the technical writer needs. But in a scientific context they have only one meaning, and the writer can assume that his readers will know this meaning. The word "power," for instance, has many meanings in ordinary parlance, but in physics it means only "rate of doing work." The word "neutron," on the other hand, though by now everyone has heard it, has not yet acquired any meaning beyond its scientific one.

These technical terms are part of the jargon of science. Jargon properly used results in clarity and conciseness, which are essential qualities in technical writing; misused, it leads only to confusion or misapprehension. Consider this sentence: "A high degree of design accuracy is achieved by measuring the value of each light ray passing through the lens." This is a real sentence, written about a new method of designing lenses. At first sight it may appear satisfactory to one who is not accustomed to careful reading of careful writing; but a moment's consideration shows that as it stands it has no real meaning at all. It was written by someone who did not understand what he was writing about but thought that the use of some bits of jargon would convey the meaning that he himself could not find. "A high degree," "accuracy," "measuring the value of" – these are phrases that are often used in technical writing; but as they are put together in this sentence they mean nothing. Worse than that, a careless or an untutored reader may be misled by them into thinking that he has learned something.

Technical writing must be clear; it must be unambiguous; it ought to be brief; it need not necessarily be dull. High literary quality is not demanded in a technical report, but clarity and accuracy are essential. It is not easy to write well, but at least the technical writer does not have to worry about his most important words; there is only one term, part of his jargon, that will serve a particular purpose, and he has only to use that term in the right place. A decent regard for the accepted standards of grammar and syntax will suffice, if he also acquires "the habit of paying all words the compliment of respecting their peculiarities."

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Washington, D.C.
National Press Club

Mr. George D. Welch
Pittsburgh, Pennsylvania
Fisher Scientific Co.

Miss Anne L. Williams
Washington, D.C.

NEW LOCAL CHAPTERS IN OUR NATIONAL ORGANIZATION

In the first issue of the *REVIEW*, an invitation was extended to Special Members to form local chapters. To date, three new chapters have been formed – Buffalo, New York; Oak Ridge, Tennessee; and Schenectady, New York.

ARTICLES AND REPORTS

A Reference Guide to Current Literature Pertaining to Technical Writing

"Preparing a Technical Manuscript" by the McGraw-Hill Book Company, Incorporated. 16 pp.

"On Saying What You Mean," published by the Royal Bank of Canada, Monthly Letter Department, 360 Saint James St., W., Montreal, Quebec, Canada. 4 pp.

"Technical Writing Grows Into New Profession: Publications Engineering" by Robert T. Hamlett, Publications Manager of the Sperry Gyroscope Company, Great Neck, New York. October 1952 "Proceedings of the Institute of Radio Engineers."

FROM THE EDITORS DESK

◀ The Society welcomes inquiries and requests for membership application blanks from potential members or individuals interested in the profession of technical writing. Merely write a letter to Mr. Hyman Kana, Secretary, Society of Technical Writers, 28 Newbury Street, Boston 16, Massachusetts.

◀ In the feature article of this issue of the *REVIEW*, Mr. Marschalk mentioned the need for technical writing courses in more of our colleges and universities. This concurs with one of the basic aims of the Society – "to encourage the development and training of technical writers."

◀ Rensselaer Polytechnic Institute has, for the second successive year, offered a week-long seminar for the profession of technical writing. Mr. Eames describes this seminar in his article. We would like to be informed of similar programs offered by other colleges and universities.

◀ As a service for members of the Society, the editor is planning to initiate a "Positions Available" section in the next issue. Material from organizations seeking personnel in the technical writing profession will be accepted through December 5.

OUR NATIONAL ECONOMY . . . .

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Shortly after Dahlgren's pioneer book, there followed other specific instructions on such weapons as the Gatling machine gun. The pattern was set; the military realized to some extent even in those days that they frequently must furnish technical information 'in the field' to men of limited background. The early books were attempts to fill this need.

By today's standards, nearly all of those books were inadequately illustrated, and were awkwardly written. Through succeeding years these inadequacies continued to plague such publications, and the problem is not entirely solved even yet. In the period from 1856 to 1920, the weapons of war were comparatively simple in design. When books concerning them were inadequate, time usually was available to learn the needed answers through trial and error. It was not until great advances were made in the design of war machines, of extensive electrical and hydraulic control systems, and eventual development of fantastically complex electronic devices, that instruction books became an item of major import to the military. Even so, their full importance was slow to be realized.

As a result, at the beginning of World War II there was a wild scramble to produce more and better manuals covering the many newly developed weapons. Yet, there was so little understanding of the best techniques to use in their production, and there were so few people available with a genuine capability in this field. As you can imagine, many a manual was produced with any of several faults: inaccuracy, lack of clarity, decorative rather than functional use of color, excessively costly bindings, and so on.

Toward the close of the war, various printing control activities within the armed forces were able, through their increased experience and responsibilities, to develop some standards which greatly helped to improve the effectiveness of subsequent technical manuals. One of those activities is the one I am privileged to head at the Navy's Bureau of Ordnance.

Perhaps you would be interested in knowing how we feel about technical manuals there. Our philosophy has been developed after some years of research and careful consideration as to the part which a technical manual program should play in the overall scheme of things.

From the strictly military standpoint, it should be realized that the effectiveness of modern complex weapons is directly affected by the accuracy and clarity of the technical manuals prepared about them. These manuals are the media for explaining what a weapon is, and what it will do. These manuals provide detailed operating instructions. They contain precise information on preventive and corrective maintenance and on overhaul. They constitute the 'bible' of the operator and maintenance technician.

It is important to military effectiveness that they be as carefully 'engineered' within their field, as are the mechanisms they concern. This calls for important decisions which determine the readability standards for text, the kinds and amounts of illustrations, the style and size of type, the quality of paper used for printing, and the practical use aspects of the bindings. Decisions affecting these things cannot be based upon price considerations alone. To do so may seriously cripple the usefulness of such books.

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This does not imply, however, that your tax money and mine should be spent lavishly for such publications. Quite the contrary, it means that the very best of training, experience and judgment should be applied to the whole problem of doing a good engineering job on our military technical manuals.

May I take a moment to draw a parallel in the engineering of an anti-aircraft gun? With a given set of requirements to be met,--requirements of range, rapidity of fire, accuracy of fire, and so forth, where there is a question of using a precision-type roller bearing as against a fraction-type sleeve bearing, the decision is based on the technical requirement, not just the cost. That is just common sense in the engineering world. We are learning now to apply the same kind of reasoning to our technical manuals.

For instance, if we have learned that text can be read with more speed, accuracy, and greater freedom from fatigue when type is set in what printers call '10 point', we would be foolish to use a smaller type to jam more words on a page, thus trying to save a few sheets of paper. If we have found that paper with a slightly dull finish causes less eye strain than paper with a high gloss surface, we should consider this an important factor in books used by enlisted men upon whose keenness of vision our defense may depend. If we have found that the use of different colors to show the different pressures in a diagram of a very complex hydraulic system may spell the difference between fast and accurate understanding of the system and just plain 'befuddlement', then we should use those colors.

Now let us consider some of the foibles in illustration techniques that have been handed down from earlier days. Many of our older illustrations looked like heavily-shaded drawings made for patent applications. We know now that excess shading is unnecessary, takes more time to accomplish, and therefore costs more than the virtually unshaded drawing. If it did a better job, the cost would be of relatively less importance. But experience has shown that heavy shading tends to obscure details.

Still another error often committed in technical illustrating is the use of 'dog-leg' arrow leaders between nomenclature and the items called out. Such a technique violates the truism that 'a straight line is the shortest distance between two points'. Dog-leg arrows take more time to draw or apply and therefore raise the cost of an illustration needlessly. Furthermore, I know of no instance where it could not be shown that straight line arrows could be used more advantageously.

There are many, many more examples of such details that I could cite for you, but their telling might easily become burdensome. I have taken the liberty of mentioning only a few so that you may appreciate better the ***kind*** of detail, the ***kind*** of ***foible,*** that we should seek to correct if we are to do a good job of technical manual production.

Now a few words as to certain checks that should be made upon the manuscript of a technical manual. We must assume that the material has been compiled with accuracy by an engineering writer or writing team whose technical qualifications are adequate. In event the book is to be one covering the description, operation and maintenance of a mechanical device, our first check should be to read the introductory paragraphs of the general description, and to look at checking prints of the first two or three illustrations. If we do not almost immediately grasp the general nature and purpose of the book's subject matter, if the text is meatless and wandering, if the illustrations are not satisfyingly informative, the book will lack an important requirement of ready understandability. If spot checking at the beginnings of later chapters reveals a similar vagueness, the book will be weak.

It may come to you as somewhat of a shock to hear that all too many instruction books are lacking in this respect. They may be technically accurate, but they do not have that journalistic touch which is characteristic of news articles in our daily papers. They do not sum up in the lead paragraphs the meat of the material to follow. They fail to tell the what, why, where, when and who that trained journalists automatically inject into news stories. Technical manuals should be considered as a kind of news article; they must not be treated in the manner of a mystery novel!

That brings us to a very important point in this whole discourse. We must realize that in our technical manuals we have a medium of communication--graphic *communication.* We are trying, through such books, to bridge the great gulf that exists between the knowledge of the responsible design engineer, and the technician with limited education who must understand, correctly operate, and maintain devices frequently of very great complexity. To span such a gap effectively, we must build our bridge of information on solid foundations of absolute accuracy, and with the strength of distinct clearness. The second of these objectives is the most difficult. Why is this so?

Well, it stems from a combination of causes. Student engineers often regard the writing of reports as a kind of drudgery. They also are prone to write with the purpose of impressing seniors with their knowledge. Their writing thus tends to become intellectually cumbersome. At best they carry over into their professional life the general idea that what they write is easily understandable to another engineer.

To compound the problem, no college or university has come to full grips with the problem of teaching engineers the many things necessary to make them good communicators. Engineering courses are weak in the humanities. How many engineering schools call for one or more years of public speaking as a requirement before graduation? Yet that subject alone would do worlds of good in helping an engineer understand some of the problems of communication. Although he might never use public

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speaking as a direct tool of his profession, the indirect benefit of such training should have far-reaching value to him. It should help him realize what gaps there are in the graphic communications he prepares. It should help him get his good ideas across to management so that worthwhile projects will not be shelved because they are not fully comprehended.

Yes, there is a dearth of people who are competent in the field of technical manual preparation. That situation is caused at one end by the growing complexity of today's implements of war and the almost equal complexity of the machinery of industry. On the other end, it is caused by lack of courses in our schools which might lead to a degree in engineering journalism. Those who have become proficient in this field are the extremely few engineers who like to write, and the somewhat larger number of writers who have leanings toward the physical sciences. From such as these, we now recruit the talent that is so sorely needed.

Now, for a moment, let me tell you of an experience I had with a supplier of an intricate mechanism required in our naval weapons program. Several years ago, when the firm was new to our field of ordnance, I noticed that the instructional material they furnished with their products was almost worthless. It lacked virtually every desirable requirement. Its only saving grace was accuracy; but there was so little text material and illustration material to go on that its accuracy value was largely nullified. I made a visit to the chief engineer, who, incidentally, later became president of the company. It was suggested to him that a good instruction book program not only was necessary from our standpoint, but that with good manuals his intricate product would be better understood, and be more certain or correct operation and effective maintenance. He bought the idea at once. In the succeeding years, the technical manuals issued by that firm have improved very greatly, and there has been a corresponding increase in the acceptance of the company's product. Consequently, it was particularly gratifying when I was told by their president recently that their decision to radically improve their instruction books had been a turning point in the development of the company!

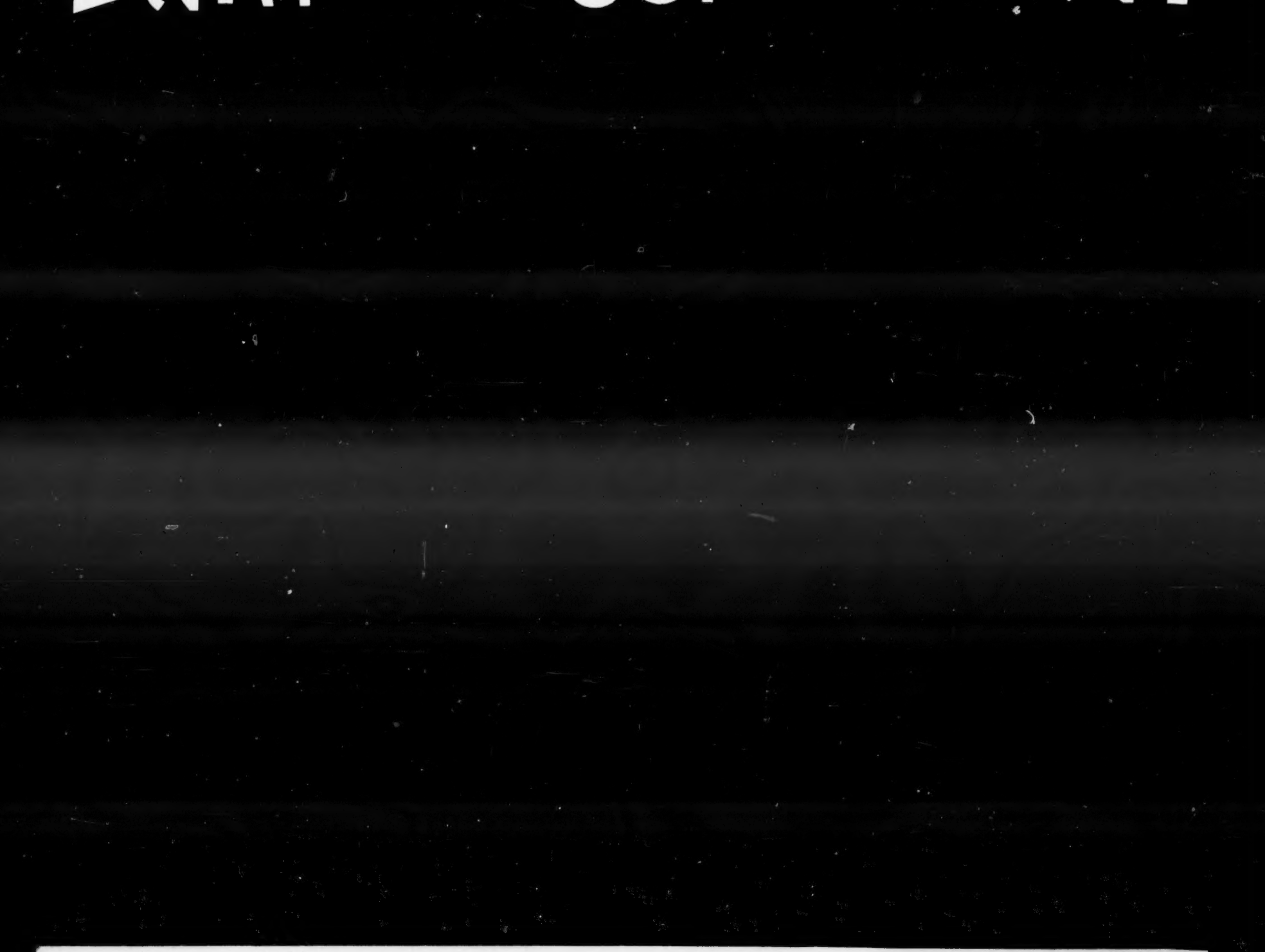
Another and still larger firm from which we procure a special type of ordnance, recently came to realize the importance of good technical manuals covering its products. It, too, has built up a very well-organized group of people who now are beginning to produce good instruction books. The firm is able to do this only because they were fortunate in finding some exceptional talent to head their technical manual operation.

Most manufacturers and engineering firms do not have, within their own organizations, the specialized 'know how' for producing good instruction books. In such instances, it usually is best for all concerned if they will make use of the services of a highly qualified firm of specialists in technical manual work. There are hundreds of companies that have sprung up in this field, most of them hoping to serve the needs of the Armed Forces.

With respect to the firms that are available today, great care should be made in their selection when important work must be done. It usually is advisable to check carefully as to their past performance, and their 'on board' talent to carry through a tough assignment. Because a firm has turned out successful books on biology is no reason to assume that it is able to handle properly a publication on involved electronics. For that reason, and because it is impractical to define and specify an instruction book to the 'nth degree, it seems to be a matter of sound business sense not to buy technical manuals solely on a price basis. It is the *usefulness and effectiveness to the reader audience* that counts. Can the operator of a device find the answers to his questions on all details necessary to get optimum performance? Can the maintenance man quickly determine what is wrong and what he must do to correct the fault? These are the true tests of the worth of such books.

Through necessity, the military have evolved a program of technical manual production on a vast scale. Although much of the past production of such books has left something to be desired, the program generally has helped to bridge the gap between designer and technician. Through trial and error, many things have been learned about more effective ways to prepare the needed manuals.

Some of the things that have been learned in developing military technical manuals are being picked up and used in industry where its own products more and more are becoming highly complex. For industry, it no longer is a matter only of the maintenance of goodwill in the efficient servicing of industry's products. It now is a matter of dire necessity. Some of industry's products and systems are nearly as complex as the fantastic weapons of the military. No one man has the capacity to retain in his own thinking all the necessary data on operation, adjustment and maintenance of such devices. The service manuals for just one large, modern commercial airplane are volumes several inches thick.

It is logical, is it not, that our world of technological things will continue to expand? Accordingly, the need for well-prepared, fully informative instruction books will continue to grow. They will be needed whether for weapons of war or instruments of peace. Imagine, if you can, the talent that will be needed when instruction manuals are prepared to cover space ships and their maintenance bases, the space platforms called satellites!

You, who have embraced the engineering profession, must realize that no program of technological development today is complete unless appropriate instruction books accompany the complex end products themselves. This is an implied obligation for you to learn more about the developing science of graphic communication. In its present concepts, we have virtually a new field to develop – one of intriguing challenge.